

### **REMARKS**

Claims 1-31 are pending in the present application. Claims 1, 2, 14, 15, 27 and 28 have been amended, and Claims 5, 18 and 31 have been cancelled, herewith. Reconsideration of the pending claims is respectfully requested.

#### **I. Claim Objection**

The Examiner objected to Claim 27, noting a typographical error. Applicants have amended such claim to correct such error. Therefore, the objection to the claims has been overcome.

#### **II. 35 U.S.C. § 101**

The Examiner rejected Claims 1-26 under 35 U.S.C. § 101 as being directed towards non-statutory subject matter. This rejection is respectfully traversed.

With respect to Claims 1-13, the Examiner states that such claims are not limited to tangible embodiments as the validation can be performed without the use of hardware. Applicants have amended such claims to specifically recite that the claimed method is a computer-implemented method.

With respect to Claims 14-26, the Examiner states that such claims recite computer-readable medium which is an intangible medium. Applicants have amended such claims to specifically recite that the claimed computer program product is tangibly embodied in a tangible computer readable medium.

Therefore, the rejection of Claims 1-26 under 35 U.S.C. § 101 has been overcome.

#### **III. 35 U.S.C. § 103, Obviousness**

The Examiner rejected Claims 1-31 under 35 U.S.C. § 103 as being unpatentable over "Equational Binary Decision Diagrams" by J.F. Groote and Jaco van de Pol ("Groote" hereinafter), and further in view of Kondo H. and Kurihara M. ("Kondo" hereinafter). This rejection is respectfully traversed.

With respect to Claim 1, such claim has been amended to include the claimed step of "establishing an ordering relationship of the binary decision diagram that allows the function symbols and variables to be compared" as described in the present Specification at page 5, lines

14-15; page 13, line 10 – page 14, line 27; page 18, lines 23-30; and Figure 12, blocks 1200 and 1202. This claimed feature allows for reducing the binary decision diagram (BDD) that represents a hardware design to a more simplified form, thus providing improvements in processing as both function symbols and variables can be compared (Specification page 13, lines 10-16). The cited Groote reference requires that function symbols be eliminated from the BDD as *it can only compare variables* (page 1, Section 1 Introduction; page 3, Section 2 EQ-BDDs, lines 1-2). While the reference makes a vague 'envisage' comment regarding incorporating function symbols into EQ-BDDs, there is no indication of how this might be done and more importantly there is no indication that such inclusion of function symbols into EQ-BDDs would result in any ability to establish an ordering relationship *such that both functions terms and variables can be compared with one another*. Nor does the cited Kondo reference teach or suggest this newly added step of Claim 1. This reference merely describes an ability to partially order function symbols in an unrelated context, but does not teach or otherwise suggest any ability to *compare function symbols and variables*. It is therefore urged that the amendment to Claim 1 has overcome this 35 USC 103 rejection.

The present invention provides improvements to performance as the binary decision diagram (BDD) remains compact. In contrast, and in order to eliminate function symbols from the BDD as required by the cited Groote reference, a complex procedure (Specification page 4, lines 23-29) is required that significantly increases the number variables, and thus the size of the resulting binary decision diagram increases significantly – significantly increasing computation time. It is therefore urged that the present invention provides non-obvious improvements to the state of the art, and is patentable in view of the cited art.

Applicants initially traverse the rejection of Claims 2-4 and 6-13 for reasons given above with respect to Claim 1 (of which Claims 2-4 and 6-13 depend upon).

Further with respect to Claim 2, Applicants have amended such claim to include features of original Claim 5 (which is thus being cancelled herewith without prejudice or disclaimer). As amended, Claim 2 recites a two-pronged technique for establishing the ordering relationship of the binary decision diagram. Initially, a first ordering relation is defined on a set of terms, the terms including *both the function symbols and the variables*. Then, a second ordering relation on a set of equalities is defined, where the set of equalities *includes equalities between the terms ordered by the first ordering relation*. The two-pronged ordering technique thus allows for

determining equality between both the function symbols and the variables – thus eliminating a previous requirement of eliminating the function symbols from the BDD prior to subsequent tautology determination processing. None of the cited references teach/suggest this claimed two-pronged ordering technique or its resulting advantage. It is thus further urged that amended Claim 2 is not obvious in view of the cited references.

Applicants traverse the rejection of Claims 14-17 and 19-30 for similar reasons given above with respect to Claim 1. Claims 18 and 31 have been cancelled herewith without prejudice or disclaimer, for similar reasons to those given above with respect to Claim 5.

Applicants further traverse the rejection of Claims 15 and 28 for similar reasons to the further reasons given above with respect to Claim 2.

Therefore, the rejection of Claims 1-31 under 35 U.S.C. § 103 has been overcome.

#### IV. Conclusion

It is respectfully urged that the subject application is patentable over the cited references and is now in condition for allowance. The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,



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